Remarks

The Office Action dated March 2, 2006 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Subsequent to entry of this amendment, Claims 1-29 are pending in this application. Claims 1, 3-7, 10, 12-15, 18, and 19 stand rejected. Claims 2, 8, 9, 11, 16, 17, and 20-29 are withdrawn from consideration.

In accordance with 37 C.F.R. 1.136(a), a three month extension of time is submitted herewith to extend the due date of the response to the Office Action dated March 2, 2006, for the above-identified patent application from June 2, 2006, through and including September 5, 2006. In accordance with 37 C.F.R. 1.17(a), authorization to charge a deposit account in the amount of $1020.00 to cover this extension of time request also is submitted herewith.

The objection to the specification under 35 U.S.C. § 112, first paragraph, is respectfully traversed.

Applicants respectfully submit that contrary to the suggestion at pages 2-7 of the Office Action, the application contains a written description in such full, clear, concise, and exact terms as to enable one skilled in the art to make and use the invention without undue experimentation.

The claims of the present application are directed to methods of estimating the helium content of a stainless steel core shroud in a boiling water nuclear reactor. Applicants submit that the claimed method is an estimating tool and not for calculating the exact helium content of the shroud. The method provides an estimate of helium content to provide a nuclear engineer with information as to whether there might be concerns of increasing helium content in the shroud. The fluxes and fluences are routinely calculated as part of shroud repairs and inspections. The fluences are typically calculated at the shroud and at the vessel wall. The claimed methods are

straightforward in that first the neutron fluence (either fast neutron fluence or thermal neutron fluence) is determined by either an actual measurement or by calculation using simulation incorporating a Monte Carlo radiation transport methodology. The Monte Carlo radiation transport methodology utilizes computer programs and nuclear data libraries that are known and available from the Department of Energy. The fluence is then used to estimate the helium content of the core shroud by using an equation developed by Applicants.

Paragraphs [0031] through [0057] provide a description of how the Monte Carlo radiation transport methodology is used to calculate fluence, including any assumptions and approximations that are used with this methodology. Also, because simulation techniques include input as to reactor core power, the core configuration, and the operating history of the reactor, these factors are automatically accounted for by the simulation techniques. Further, a direct measurement of the fluence of a reactor is a result of these factors and as such are not something that one skilled in the art needs to take into account when using the claimed method.

The Office Action, at page 2, suggests that "applicant is essentially telling an artisan that, although the equation was derived from a specific set of test conditions and parameters, it can be used for generic application on any boiling water reactor and the results are expected to be accurate". Applicants disagree with this suggestion because the claimed method is used for estimating the helium content of the shroud not for determining an exact helium content. Applicants submit that the claimed method requires calculating the fluence of the BWR or actually measuring the fluence of the BWR. As explained above, simulation programs require input on the reactor parameters, such as reactor core power, core configuration, operating history, core and shroud geometry, and the like. These parameters are then used in the calculations of the fluence. Also, as explained above, an actual measurement of the fluence

automatically takes into account these reactor parameters. Because of this, the claimed method is useful for estimating helium content in all types, sizes, and different shaped BWRs. Applicants submit that no concrete evidence, such as an article or another patent, has been provided that show that the claimed method would not work in any BWR other than the BWR that was used to develop the claimed method. Only a mere assertion has been set forth. Applicants submit that using one BWR or a pilot facility to develop tools, such as the claimed method of the present application, is routine.

Applicants also disagree with the assertion, at page 3 of the Office Action, that because details as to sample placement and the specific parameters of the BWR during the development of the claimed method were not specifically disclosed, "an artisan must resort to a trial-and-error process to exercise the claimed invention". Applicants submit that this is not true. The claimed method does not require trial-and-error process. One skilled in the art knows that the parameters of a BWR are taken into account when calculating fluences in a reactor using simulation programs. As explained above, these parameters are required inputs in simulation programs. Also, simulation programs can calculate fluences at hundreds of shroud locations just as easily as calculating the fluence at one shroud location. Applicants submit that calculating fluences at numerous shroud locations is not undue experimentation, but rather, simply practicing the claimed method.

Further, Applicants disagree with the assertion that the flow chart of the claimed method illustrated in Figure 2 is a block diagram "with no description of internals thereof". Particularly, Applicants submit that Figure 2 is described in paragraphs [0023] through [0030]. Further, Figure 3 is a flow chart of the step determining 78 the neutron flux using a Monte Carlo Radiation Transport Methodology. Figure 3, is described in Paragraphs [0031] through [0057]

providing a description of how the Monte Carlo radiation transport methodology is used to calculate the fluence, including any assumptions and approximations that are used with this methodology. Applicants submit that Figures 2 and 3 are described in sufficient detail in paragraphs [0023] through [0057] to permit one skilled in the art to practice the claimed invention. Applicants further submit that In re Scarbrough is not analogous to Applicants application because Scarbrough's claims are directed to a system while Applicants claims are directed to a method.

Furthermore, Applicants submit that the assertion at page 5 of the Office Action that "[a]n artisan has to verify the accuracy of the helium values calculated from the equation, in order to determine whether sufficient flux measurements at the various shroud locations have been made or whether sufficient scope of flux calculations has been done" is incorrect and has no basis. As explained above the claimed method is directed to estimating the helium content of a stainless steel core shroud in a boiling water nuclear reactor. Applicants submit that the claimed method is an estimating tool and not for calculating the exact helium content of the shroud. The claimed method produces an estimate of helium content to provide a nuclear engineer with information as to whether there might be concerns of increasing helium content in the shroud. Again, only a mere assertion has been made that the results of the claimed estimating must be validated. No concrete evidence has been provided that show that the results of the claimed estimating must be validated. Further, the reasons for the need for validation, " in order to determine whether sufficient flux measurements at the various shroud locations have been made or whether sufficient scope of flux calculations has been done" is inaccurate and is unsubstantiated by the Examiner. As explained above, calculating fluence using simulation programs are not foreign to one skilled in the art, and while not easy to use, produce validated

results. These simulation programs require input on the subject reactor parameters, such as reactor core power, core configuration, operating history, core and shroud geometry, and the like. These parameters are then used in the calculations of the fluence. Also, as explained above, an actual measurement of the fluence automatically takes into account these reactor parameters. Further, Applicants submit that the claimed method was developed using a fully validated computer model that benchmarked helium production in the shroud against experimental measurements. Additional validity testing would be redundant and not needed.

The reasons for the objection to the specification listed in the 10/03/05 Office Action are again addressed below. Applicants submit that these reasons do not support the objection under Section 112 because they are just bald unsubstantiated assertions.

The claims of the present application are directed to methods of estimating the helium content of a stainless steel core shroud in a boiling water nuclear reactor. The methods are straightforward in that first the neutron fluence (either fast neutron fluence or thermal neutron fluence) is determined by either an actual measurement or by calculation using simulation incorporating a Monte Carlo radiation transport methodology. The Monte Carlo radiation transport methodology utilizes computer programs and nuclear data libraries that are known and available from the Department of Energy. The fluence is then used to estimate the helium content of the core shroud by using an equation developed by Applicants. The specification provides ranges for the variable b_j depending on the type of fluence that has been measured. One skilled in the art would understand that a simple interpolation of the b_j ranges provides the appropriate value of b_j. Also, the specification in paragraph [0023] clearly indicates that the equation recited in the claims estimates the helium production in the shroud to within 10 percent for thermal fluences up to 1.0 e^{21} n/cm^2 and for fast fluences up to 5.0 e^{20} n/cm^2, and that beyond

this fluence limit, a two-stage nickel reaction has contributions to helium production in the stainless steel shroud that exceeds 10 percent. Further, Applicants submit that paragraphs [0027] through [0030] describe how the correlation between neutron fluences and helium content in the core shroud was derived.

Applicants also disagree with the suggestion at page 4 of the 10/03/05 Office Action, that the "approximations, assumptions, and estimates utilized in arriving at the correlation" are factors that are "required to properly apply the equation and operatively practice the invention". Applicants submit that to operatively practice the invention, one has to measure or estimate the fluence and using the fluence value determine the value of b_j, and then enter these values into the recited equation to produce an estimate of the amount of helium in the stainless steel core shroud of the reactor. Applicants note that the Federal Circuit has opined in *Verve LLC v. Crane Cams, Inc.*, 65 USPQ 2d 1051, 1053-1054 (Fed. Cir. 2002), that "[p]atent documents are written for persons familiar with the relevant field; the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field."

Further, Applicants disagree with the suggestion at page 4 of the 10/03/05 Office Action, that the disclosure is insufficient for a list of reasons that Applicants submit are detailed in the specification or would be known by one skilled the art. Particularly, Applicants submit that one skilled n the art would understand from reading the specification that the method applies to all types of stainless steel used to fabricate core shrouds in boiling water reactors. Applicants submit that as explained above paragraph [0023] of the specification clearly indicates that the equation recited in the claims estimates the helium production in the shroud to within 10 percent for thermal fluences up to 1.0 e^{21} n/cm^2 and for fast fluences up to 5.0 e^{20} n/cm^2, and that beyond

this fluence limit, a two-stage nickel reaction has contributions to helium production in the stainless steel shroud that exceeds 10 percent. Also, Applicants submit that one skilled in the art would know from reading the specification that boron means natural boron, and that at a natural boron concentration of 3 wppm or above that impurities other than boron are insignificant because helium production is dominated by boron. Applicants further submit that the specification and the claims clearly indicate that the equation applies to boiling water reactors, and that one skilled in the art would know from reading the specification that the correlation uses an input of fluences regardless of how they are arrived at, measured or calculated, and whether the reactor was a low capacity or a high capacity reactor is irrelevant because the fluence measurements account the this. As to the reference to the Ganesan and Goel letters to the editor, there is no requirement in Section 112, first paragraph, to rebut or discuss the opinions of other scientists. Applicants submit that the claimed correlation is based on rigorous derivation of the interaction of neutrons with matter and captures any non-linearity of the interaction.

Further, Applicants submit that pre-, inter-, and post-processor software in association with a Monte Carlo radiation transport methodology are terms of art and that one skilled in the art would know the meanings.

At least for the reasons set forth above, Applicants submit that the specification meets all the requirements of Section 112, first paragraph.

The rejection of Claims 1, 3-7, 10, 12-15, 18, and 19 under 35 U.S.C. § 112, first paragraph, is respectfully traversed.

For the reasons set forth above, Applicant respectfully submits that the specification is written in such full, clear, concise, and exact terms as to enable any person skilled in the art to

practice the described invention. Claims 1, 3-7, 10, 12-15, 18, and 19 recite methods for calculating a helium content of a stainless steel core shroud in a boiling water nuclear reactor.

For the reasons set forth above, Applicants respectfully request that the Section 112, first paragraph, rejection of Claims 1, 3-7, 10, 12-15, 18, and 19 be withdrawn.

The rejection of Claims 1, 3-7, 10, 12-15, 18, and 19 under 35 U.S.C. § 112, second paragraph is respectfully traversed.

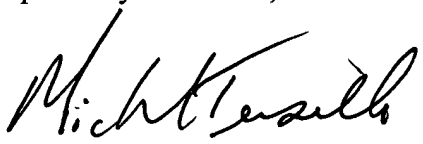
Applicants submit that one skilled in the art knows what is meant by "full power phase of the fuel cycle". It is well known in the art that the reactor fuel cycle includes a start-up phase, a full power phase, and a shut-down phase.

For the reasons set forth above, Applicants submit that Claims 1, 3-7, 10, 12-15, 18, and 19 are definite and particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

For the reasons set forth above, Applicants respectfully request that the Section 112, second paragraph, rejection of Claims 1, 3-7, 10, 12-15, 18, and 19 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,



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